NON-REINFORCED CONCRETE BLOCK WALLS

1. SCOPE

Work includes furnishing and installing concrete retaining wall units to the lines and grades designated on the Drawings and as directed by the ENGINEER.

2. MATERIALS

2.1. **Type I Wall Units**: Shall be a Keystone material, or an approved equivalent. All walls must conform to the requirements of ASTM C1372 - Standard Specifications for Segmental Retaining Wall Units and the following:

Minimum Structural, Geometric, Construction Requirements	
Compressive Strength	3,500 psi
Unit Size	8" H x 18" W x 18" D ± 1/8 inch
Unit Weight	100 lbs/unit

The walls shall have a vertical setback between 1/8 inch and 1 inch per course. The alignment and grid positioning mechanism is with fiberglass pins set at a minimum of two per unit minimum. The maximum horizontal gap between erected units shall be less than or equal to 1/2 inch.

2.2. **Type I Wall Shear Connectors**: Shear connectors shall be 1/2 inch diameter thermoset isopthalic polyester resin-pultruded fiberglass reinforcement rods or equivalent to provide connection between vertically and horizontally adjacent units. Strength of shear connectors between vertical adjacent units shall be applicable over a design temperature of 10°F to 100°F. Shear connectors shall be capable of holding the geogrid in the proper design position during grid pre-tensioning and backfilling.

2.3. **Type II Wall Units**: Shall be as manufactured by Redi-Rock or an approved equivalent. The type of wall units used shall be approved by the ENGINEER before construction is allowed to begin.

2.3.1. Concrete: Shall have minimum 28 day compressive strength of 4,000 PSI

2.3.2. Shear Knobs: Shall have a height of 4 inch minimum and 8 inch minimum diameter and be set approximately 1/2 the length of the block and at least 6 inches from the edges for full size blocks. Knobs must be 6" diameter for corner blocks.

2.3.3. Sizes:

Full size blocks- 18 inches tall x 46 inches wide x 28 inches, 41 inches, or 60 inches deep
Half size blocks- 18 inches tall x 23 inches wide x 28 inches, 41 inches, or 60 inches deep
Corner blocks- 18 inches tall x 46 inches wide x 24 inches deep

2.4. **Aggregate Backfill**: Shall conform to the "Crushed Aggregate and Channel Lining" technical specification.

2.5. **Pipes**: Shall conform to the "Pipe" technical specification.

2.6. **Concrete**: Shall be Class "AA" concrete conforming to the "Concrete" technical specification.

2.7. **Steel Reinforcement**: Shall be 60 KSI steel conforming to the "Steel" technical specification.

2.8. **Geo-grid**: Shall be a bi-axial product conforming to the "Geo-grid" technical specification.

3. CONSTRUCTION

Check the materials upon delivery to assure proper material has been received and shall protect the materials from damage. Damaged material shall not be incorporated in the project. Prevent excessive mud, wet cement, and like materials from coming in contact with the units.

Excavate to the lines and grades shown on the Drawings. Construct the reinforced concrete footer on undisturbed soil unless the ENGINEER requires a geo-grid and crushed aggregate pad prior to concrete placement. The pad must cure for a minimum of 7 days before placing any block on the footer. For steps and pavers, a minimum of one to 1-1/2 inches of free draining sand shall be screed smooth to act as a placement bed for the steps or pavers.

All walls should terminate into the existing ground either due to winged ends or 90° corners.

3.1. Type I Wall Unit Installation:

3.1.1. Blocks: Place the first course of units on the footer at the appropriate line and grade. Check the alignment and level in all directions and insure that all units are in full contact with the base and properly seated. Place the front of units side-by-side. Do not leave gaps between adjacent units. Layout of corners and curves shall be in accordance with the manufacturer's recommendations. Install shear/connecting devices per manufacturer's recommendations. Place and compact drainage fill within and behind wall units. Place and compact backfill soil behind drainage fill. Follow wall erection and drainage fill closely with structure backfill. Maximum stacked vertical height of wall units, prior to unit drainage fill and backfill placement and compaction, shall not exceed two courses.

3.1.2. Structural Geo-grid Installation: Orient uni-axial geo-grid shall be oriented with the highest strength axis perpendicular to the wall alignment. Place the geo-grid horizontally on compacted backfill and attach to the modular wall units. Insert fiberglass rods into the blocks. Place the next course of modular concrete units over the geo-grid. Pull the geo-grid taut and anchor prior to backfill placement on the geo-grid. Geo-grid reinforcements shall be continuous

throughout their embedment lengths and placed side-by-side to provide 100% coverage at each level. Spliced connections between shorter pieces of geo-grid or gaps between adjacent pieces of geo-grid are not permitted.

3.1.3. Reinforced Backfill Placement: Place, spread, and compact reinforced backfill in in lifts not to exceed 6 inches where hand compaction is used or 8-10 inches where heavy compaction equipment is used. Compact reinforced backfill to 95% proctor. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Only lightweight hand-operated equipment shall be allowed within 3 feet from the tail of the modular concrete unit. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid. Rubber tired equipment may pass over geogrid reinforcement at slow speeds, less than 10 mph. Sudden braking and sharp turning shall be avoided. At the end of each day's operation, slope the last lift of reinforced backfill away from the wall units to direct runoff away from wall face. Do not allow surface runoff from adjacent areas to enter the wall construction site.

3.1.4. Cap Installation: Glue cap units to underlying units with an all-weather adhesive recommended by the manufacturer.

3.2. **Type II Wall Unit Installation**

3.2.1. Blocks: Place the first course of units on the footer at the appropriate line and grade. Check the alignment and level in all directions and insure that all units are in full contact with the base and properly seated. Place the front of units side-by-side. Do not leave gaps between adjacent units. Layout of corners and curves shall be in accordance with the manufacturer's recommendations. Install shear/connecting devices per manufacturer's recommendations. Place and compact drainage fill within and behind wall units. Place and compact backfill soil behind drainage fill. Follow wall erection and drainage fill closely with structure backfill. Maximum stacked vertical height of wall units, prior to unit drainage fill and backfill placement and compaction, shall not exceed two courses.

Grind smooth any rough edges on the back of the concrete blocks prior to placement to avoid damage to the geogrid under tension.

3.2.2. Structural Geo-grid Installation: For any 21 inch block wall with heights greater than 15 feet or any 21 inch block wall regardless of wall height that will have constant additional surcharge loadings applied behind it, the contractor will be required to install geo-grid and make proper connection to the retaining wall blocks for reinforced soil walls. For 41 inch or 60 inch block walls, geo-grid may not be needed. Always check final plan design for these types of walls to see if geo-grid will be used. Place the bi-axial geo-grid perpendicular to the wall. Place the next course of modular concrete units over the geo-grid. Pull the geo-grid taut and anchor prior to backfill placement on the geo-grid. Geo-grid reinforcements shall be continuous throughout their embedment lengths and placed side-by-side to provide 100% coverage at each level. Spliced connections between shorter pieces of geo-grid or gaps between adjacent pieces of geo-

grid are not permitted.

Geo-grid placement on corners shall follow the procedures outlined in the Design Manual for Segmental Retaining Walls, Second Edition, Copyright 1997, National Concrete Masonry Association, Herndon, VA. See the following details or convex and concave curve corners.

3.2.3. Reinforced Backfill Placement: Place, spread, and compact reinforced backfill in in lifts not to exceed 6 inches where hand compaction is used or 8-10 inches where heavy compaction equipment is used. Compact reinforced backfill to 95% proctor. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Only lightweight hand-operated equipment shall be allowed within 3 feet from the tail of the modular concrete unit. Tracked construction equipment shall not be operated directly upon the geo-grid reinforcement. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geo-grid. Tracked vehicle turning should be kept to a minimum to prevent tracks from displacing the fill and damaging the geo-grid. At the end of each day's operation, slope the last lift of reinforced backfill away from the wall units to direct runoff away from wall face. Do not allow surface runoff from adjacent areas to enter the wall construction site.